

# EXHIBIT 10

Glacier Northwest, Inc. and Reichhold, Inc.

## DRAFT Summary of Existing Information and Data Gaps Report

*Glacier Northwest, Inc. –  
Reichhold, Inc. Site  
Seattle, Washington*

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catch basins and piping. A map of the Port of Seattle T115 storm sewer network is provided in **Appendix C**. Storm water discharged from the 48-inch-diameter City of Seattle SPU outfall is collected from a large drainage basin consisting of City of Seattle municipal storm drains. A map showing the drainage basins along the LDW is also provided in **Appendix C**.

### 2.3.3 *Historical Storm Sewer Network*

The as-built storm sewer drawing for the Glacier property shows a 15-inch-diameter concrete storm water pipe with five catch basins in the southern portion of the Site. This pipe was not used by Glacier in the past and is not operational as part of Glacier's current storm water collection system. It is documented to have been installed in 1975. Additionally, no evidence of the storm water system was observed or verified by Glacier (Lone Star) since the property acquisition in 1985. A records review and multiple test pits have been completed to gather information on the presence, alignment, and condition of this pipe and catch basins at the Site.

The storm sewer network tie-in location was verified via an in situ camera survey conducted by Glacier and Reichhold in July 2009. In October 2009, a trench was excavated across the southern Site access drive, where the as-built plans showed the pipe to be located and the tie-in location was determined based on the camera survey. Additional localized areas were excavated to attempt to locate the buried catch basins. Field activities confirmed the presence of the 15-inch-diameter concrete pipe that ties into the City of Seattle SPU, 48-inch-diameter, storm sewer mainline south of the Site. However, none of the five catch basins shown on historical Site as-built drawings, or additional storm lines, were located in the field by means of excavation.

### 2.3.4 *Geology*

Shallow Site geology is generally divided into four distinct and well-divided zones as described below. Cross-section locations are illustrated on the Cross-Section Location Map (**Figure 2-3**). Cross-sections A-A', B-B', and C-C' (**Figures 2-4** through **2-6**, respectively) present the lithology observed in exploratory borings completed across the Site to date. The Site is fill underlain by the native Duwamish tidelands that has been filled in stages. The LDW was initially dredged from 1913 to 1922 to straighten and deepen the waterway. After that initial dredge, the general practice in the LDW area during decades of industrial development from the late-1940s to the mid-1970s was for dredged materials from the Duwamish

River to typically be used as fill material. This fill was likely added to raise the Site above water level, thus rendering the Site suitable for development. As the area of the Site prior to development was historically "riverine tidal wetland" (King County 2005), the native ground surface would be expected to be between the mean high and mean low water levels. The boring logs from the environmental investigations at the Site document a subsurface layer that has the lithology, high organic content, and elevation relative to the LDW that consistently identify the geologic layer as fill material. In addition, this fill layer extends above the mean-high and mean-higher-high water lines at the Site (see **Figure 2-4**) and therefore is likely not native material.

Miscellaneous historical, vertical filling has occurred at the Site; however, exact years of fill events cannot be determined based on aerial photograph review. Based on review of aerial photographs and historical records, the following dates of filling activity have been identified:

- Pre-1922 – filling during the dredging of the Duwamish Waterway;
- 1964-1969 – filling along the shoreline during development of the Kaiser Cement Terminal operation;
- 1960-1967 – filling and construction of the MRI property, which contributed fill to the southern boundary of Site; and
- 1967-1974 – filling by Port of Seattle to create land surface for the construction of the T115 site, which formed the southern end of the Bay.

The majority of the ground surface on the southern portion of the southern section of the Site is unpaved and covered with a layer of gravel and crushed rock approximately 1 to 3 feet thick. The remainder of the southern portion of the Site is overlain by a surface layer of fill material, which consists of silt, sand, gravel, and concrete debris. This fill layer extends to a depth of approximately 3 to 5 feet below ground surface (bgs). As discussed in the *Lower Duwamish Waterway Source Control Action Plan for Glacier Bay Source Control Area (SCAP)* and the *Summary of Existing Information and Identification of Data Gaps (SEIDG)* (SAIC 2007a, b), shallow fill on-site is believed to be from off-site sources.

The uppermost fill material is underlain by a silty sand/sandy silt fill layer approximately 8 to 13.5 feet thick. The silty sand/sandy silt layer is typically wet from 5 to 6 feet bgs. This layer of fill material is defined as fine to medium sandy silt, well to poorly graded sandy silt with a color ranging from gray to black. The lithology, high organic content, and elevation of this subsurface relative to the LDW indicate that this layer is

consistent with dredge material placed as fill at the Site. At approximately 8.5 to 15.5 feet bgs, a silt layer is present, approximately 5.5 to 6.5 feet thick. This geologic layer is believed to be the uppermost native material at the Site. The silt is slightly clayey, low to medium plasticity, contains some organic material, and is usually dry to moist. The silt layer is an aquitard and serves as a barrier between the shallow aquifer and the lower aquifer.

The silt layer is underlain by a sand layer that is at least 11.5 feet thick. This lower sand layer is encountered at 15 to 18 feet bgs and consists of well to poorly graded sands defined as black, fine to coarse sand. This lower sand layer is moist to wet.

### 2.3.5 *Hydrogeology*

#### 2.3.5.1 *Existing Groundwater Monitoring Wells*

The 27 existing Site groundwater monitoring wells were installed between 1995 and 2003. Twenty-four of the wells are screened in the shallow aquifer with intervals between 3.0 and 15.0 feet bgs. Three wells, MW-1D, MW-2D, and MW-3D, are screened in the lower aquifer with screened intervals varying between 17.5 and 25.5 bgs. Site monitoring well network locations are presented on **Figure 2-7**.

#### 2.3.5.2 *Groundwater*

Two distinct, saturated zones have been identified underlying the Site. Shallow groundwater present within the surface fill and upper silty sand/sandy silt (fill) units is encountered beneath the Site between 4 and 13 feet bgs. This shallow aquifer lies above the aquitard, which is the organic silt and clay layer defined above. The saturated thickness of the shallow aquifer varies across the Site from 2 to 11 feet, and also experiences seasonal fluctuations of approximately 2 to 3 feet.

Based on data collected to date during previous environmental investigations, the saturated thickness of the shallow aquifer is at a minimum during the drier months between June and October and increases during the winter months of December, January, and February. The saturated thickness of the shallow aquifer also varies across the Site, with the greatest thickness occurring in the northern portion and thinning towards the south.

Based on data collected from March and June 2009 water level measurement events, the general direction of groundwater flow in the

redevelopment of the Site into a cement terminal by the Port of Seattle and Kaiser.

Steam was used in the production process to produce the necessary heat to raise the temperatures of the process solutions. Based on the time period of the plant operations (1946 to 1958), the transformers present on-site would have been owned by Seattle City Light. There is no documented use of transformers with polychlorinated biphenyl (PCB)-containing oils at the Site.

There are no waste disposal areas on-site that have been identified either through personnel interviews or aerial photo reviews. Historical records indicate that general plant solid wastes were collected and disposed of off-site.

Washwater was generated from both the urea formaldehyde resin process and the phenol formaldehyde resin process. The washwater from both processes was discharged to the on-site washwater impoundment area. The washwater from the phenol formaldehyde resin process was routed through aboveground wooden tanks prior to discharge to the impoundment area to allow retention time for degradation of phenol.

In 1956, an outfall was constructed which conveyed cooling waters from the formaldehyde and pentachlorophenol process to a washwater impoundment area and then subsequently to the outfall. The pentachlorophenol process was discontinued at the Site in 1956. All operations at the Site were discontinued in 1958. Washwater from the resin processes continued to be conveyed to the washwater impoundment area and not to the outfall.

Regarding storm water, the aerial photos identify a surface ditch along the southern side of the property that was used to capture and route storm water run-on and run-off from the unused western side of the Site to the LDW.

### **3.4 PORT OF SEATTLE AND KAISER CEMENT COMPANY OPERATIONS**

From 1964 to 1969, the Kaiser Cement Company leased the property from the Port of Seattle, during which time demolition of the former U.S. Army and Reichhold plant structures and construction of the Cement Terminal building and multiple silos and dock were completed. Kaiser Cement Company purchased the land from the Port of Seattle in 1969 and continued operating a cement terminal on the property until 1987, an

operational period of 18 years. In order to gain an understanding of activities and developments occurring on the Site during the Port of Seattle and Kaiser Cement Company ownership of the Site, aerial photographs covering the ownership periods were reviewed. In the review of a 1967 aerial photograph, the buildings associated with former U.S. Army and Reichhold operations on the northern side of the Site were in the process of being demolished by Port of Seattle/Kaiser. A dark wide ditch is evident along the southern side of the easternmost partially demolished building and extends to the LDW. South of the ditch and partially demolished buildings is a fenced-in dirt yard that appeared to be actively used at the time the photograph was taken. The stereo pair photograph analysis of the 1967 aerial photograph identifies small piles of soil or fill material that appear to be multiple dump truck loads, staged along the southern side of the yard and along the western fence line of the yard. At the time the photograph was taken, the southern and western portions of the Site did not appear to be active. Along the southern property boundary, a wide ditch is evident, which appears to convey storm water to the LDW. A review of the 1969 aerial photograph documents that the Kaiser Cement Terminal was fully constructed and operational at that time. The Cement Terminal occupies approximately 4.12 acres of the Site and consists of 16 silos, a small building, and a large dock constructed in the Bay.

Review of a 1974 aerial photo of the Kaiser operations indicates the Cement Terminal operations are ongoing, early construction activities for a new building (i.e., current maintenance building) and also shows the presence of a large disturbed area in the southeastern corner of the property. The area covers approximately 0.32 acres. In the 1985 environmental audit report, it was reported that Kaiser used this area for disposal of waste sand, gravel, and cement slurries from the Kaiser facility (Parametrix 1985). However, this is not consistent with Glacier and Reichhold's current understanding of this area. According to available information, Kaiser used bentonite for the installation and development of oil wells in Alaska. It is believed the material that appears in the 1974 aerial photo is bentonite that was mistakenly pumped into a cement silo, requiring its discharge from the silo before refilling the silo with the Cement that was supposed to be in it. The 1985 report also indicates that the area was excavated and removed by a lessee to Kaiser; however, the dates or details were not described. **Figure 3-4, Historical Site Plan – Kaiser Operations 1974**, depicts the Kaiser operational features.



from non-detect to approximately 830 mg/kg. Pentachlorophenol concentrations did not exceed the MTCA Method C cleanup levels for industrial soil.

However, during this recent review of the laboratory reports provided in the RETEC RI report, Shaw discovered that the highest PCP concentration in soil was 1,000 mg/kg collected from GP-16 at 7 to 8 feet bgs, which is below the MTCA Method C Soil Cleanup Level for PCP. GP-16 is located within the arsenic treatment zone discussed in Section 3. **Figure 2-6** presents the pretreatment concentrations of PCP in soil.

Pentachlorophenol in Groundwater. PCP was also detected in groundwater samples collected in the vicinity of the former PCP pilot scale production plant and in the former impoundment area. The two PCP plumes do not appear to be connected and may have been a result of two separate release processes. PCP in groundwater is likely a result of PCP solids dissolving in groundwater. **Figure 2-7** presents the peak pretreatment concentrations of PCP in groundwater.

## **2.6.2 Arsenic**

Arsenic in Soil. It is well-documented that Reichhold and Glacier never used arsenic on this property. As stated earlier, the source(s) of the arsenic on the site is assumed to be a fill issue. Based on the RI, arsenic contaminated soil was determined to be restricted to the southeastern portion of the site. The highest concentrations of arsenic in soil were found in the south-central portion of the site in the vicinity of a former east-west running ditch.

**Figures 2-8 and 2-9** present the lateral presence of arsenic in soil at depths of 0 to 7 feet bgs, and 7 to 16 feet bgs, respectively. The results of soil sampling indicate that the highest concentrations of arsenic in soil are present in the south-central portion of the site extending at depth to the southern property boundary.

Arsenic concentrations detected in 9 of the 10 soil samples collected (RETEC, 1995) from 0 to 7 feet bgs in the northern portion were less than 30 mg/kg. Composite soil samples (Parametrix, 1985, Composite Sample No. 1) and one soil sample (RETEC, 1995, Test Pit 6) collected in the northeast portion of the site had concentrations of total arsenic of 51 mg/kg and 48 mg/kg, respectively.

The highest arsenic concentrations reported from soil samples are located at depths between 7 and 16 feet bgs, which are depths associated with the shallow groundwater zone. A soil sample collected from boring GP-9 at a depth of 11 to 12 feet bgs located near the eastern edge of the property had an arsenic concentration of 1,100 mg/kg. A soil sample collected at a depth of 13





to 13.5 feet bgs from the boring for monitoring well MW-19, located in the south-central portion of the site, had an arsenic concentration of 2,240 mg/kg.

The soil sampling data from shallow (surface to 7 ft bgs) and deep (7 to 16 ft bgs) soils indicate that arsenic is present in concentrations greater than 30 mg/kg in the areas sampled in the central and south-central portion of the site. The furthest west and north portions of the property (within 200 feet of the property line) have had minimal soil sampling to identify potential arsenic source areas. A composite of 3 soil samples collected from the west portion of the property (Parametrix, 1985, Composite Sample No. 4) had an arsenic concentration of 20 mg/kg.

**Arsenic in Groundwater.** **Figure 2-10** presents estimated isoconcentration contours of dissolved arsenic in groundwater prior to remediation. The figure presents both the estimated dissolved arsenic concentrations to 500 µg/L as estimated by RETEC in the RI and the isoconcentrations to 100 µg/L based on the additional monitoring well data from the FD-GTI 1998 sampling event. Arsenic concentrations in groundwater were highest in the southeast portion of the site near the property boundary. The RI postulated that arsenic on the site may be from off-site sources.

### ***2.6.3 Seep Data***

Two different seep sampling events have been conducted along the shoreline adjacent to this site. One was conducted by Hart Crowser in 1995. A more extensive survey and sampling of seeps along the LDW was conducted by Windward Environmental, LLC (Windward) in 2004. The two investigations are summarized below. The approximate seep sample locations are shown on Figure 2-2.

Hart Crowser collected water samples from three surface water seeps on May 15, 1995. The seeps were observed to discharge from the shoreline adjacent to the site and appeared to reflect discharges from the perched groundwater zone. Samples collected from these seeps were designated as locations SW-01, SW-02, and SW-03 (shown on Figure 2-2). Sampling corresponded to early flood tide conditions which occurred immediately after a relatively low tide event on that day. Sampling at all three locations occurred as late as possible during the rising tide, but before inundation of the sampling locations, to allow for maximum drainage of seawater (Hart Crowser, 1995).

The seep samples were submitted for laboratory analysis of arsenic, silver, semi-volatile organics (SVOCs), and TPH. Silver, pentachlorophenol and breakdown products, and TPH were not detected in samples SW-01, SW-02, and SW-03 and therefore did not exceed the ambient surface



water quality criteria and MTCA cleanup levels. Total arsenic concentrations were detected in SW-01 at 85 µg/L, in SW-02 at 82 µg/L and in SW-03 at 30 µg/L. (Hart Crowser, 1995).

In July of 2004, two seeps (61 and 62) were identified along the shoreline of the site by Windward. The area was characterized as an area with high seepage level as several rivulets were observed flowing along the shoreline. Seeps 61 and 62 were selected for sampling because the water associated with Seep 61 was discolored and a sulfide odor was observed during the seep reconnaissance survey, and dioxins/furans were detected in the sediment near Seep 62 (SAIC, 2007).

Samples from Seeps 61 and 62 were analyzed for metals, mercury, SVOCs (including pentachlorophenol and its breakdown products), VOCs, PCBs, organochlorine pesticides, TOC, dissolved organic carbon, and TSS. Volatile organics and SVOCs were not detected in the seep samples. Organochlorine pesticides were not detected in either sample; however, the reporting limits for three pesticides in the Seep 61 sample were greater than the marine chronic water quality criteria (WQC). Arsenic, cadmium, lead, mercury, silver, and zinc concentrations were reported in the seep samples. The filtered arsenic concentration reported in Seep 61 (72.4 µg/L) exceeded the chronic and acute (36 and 69 µg/L, respectively) WQC (Windward, 2004).

Acute WQC represent 1-hour average concentrations not to be exceeded more than once every three years on the average for metals and PCP. Chronic WQC represent 4-day average concentrations not to be exceeded more than once every three years on the average for metals and PCP. Acute and chronic WQC for metals (except the chronic WQC for mercury) represent dissolved concentrations, therefore, comparisons are made using filtered samples (WAC 173-201).

The direct comparison of seep concentrations to WQC are provided as a preliminary screening of seep data. Seeps do not represent a constant source of exposure to aquatic organisms in the LDW; however, the exposure period for chronic criteria is based on a continuous 4-day average concentration. Therefore, the applicability of chronic WQC to seep water as an indicator of risk to aquatic organisms needs to account for exposure duration in future comparisons.



The 11 samples obtained on 7/6/2000 show a broad range of ratios (0.08 to 1.07) over the sampled area, indicating a redox gradient across the site. This could be due to the site transitioning between redox states in response to the end of the hydrogen peroxide injections or the start of the ozone treatment system. Seasonal influences may also be contributing to the redox cycling.

### *5.3.3.2 Iron Filtered/Unfiltered Ratios*

Samples from the 8/12/1999 and 7/6/2000 events were analyzed for iron as well as arsenic in the filtered and unfiltered splits. These data are summarized in **Table 5-3**. The iron filtered/unfiltered ratios for these two rounds of samples from each well are shown in **Figure 5-3**. These ratios show a remarkable similarity to the arsenic ratios shown in **Figure 5-2**, and provide independent evidence for redox cycling at the site. The 11 samples obtained on 8/12/1999 all show very low (0.003 to 0.17) filtered/unfiltered iron ratios, as was the case for arsenic. The iron ratios from the 7/6/2000 sample event show an almost identical transition pattern as displayed by the arsenic ratios, which can be seen by comparing the data from this sample event in Figures 5-2 and 5-3, thus confirming that a redox gradient existed at the site at this point in time.

### *5.3.3.3 Arsenic Concentrations in Filtered Samples*

The concentrations of arsenic in filtered samples from the four sampling events are shown in **Figure 5-4**. Note that a logarithmic scale is used for the vertical concentration axis so that the full range of concentrations can be clearly seen. The figure shows that oxidizing conditions, which prevailed during the 8/12/1999 sample event, results in arsenic concentrations that are in some cases over an order of magnitude lower than the concentrations under reducing conditions. This cycling of arsenic concentrations is expected because arsenic tends to adsorb on iron oxide surfaces under oxidizing conditions, but is more mobile under reducing conditions as explained in the section above.

### *5.3.4 Arsenic Summary*

Temporal variations in the filtered/unfiltered ratios for arsenic and iron, and the absolute arsenic concentrations in filtered samples, provide three independent lines of evidence for redox cycling at the site. A conceptual geochemical model for arsenic behavior at the site can be developed from these observations as follows:

1. The sampled shallow water-bearing unit underlying the site is naturally reducing, so naturally occurring arsenic plus additional sources of arsenic (e.g., fill or dredge material)



is dominantly present in the soluble and mobile trivalent form under undisturbed conditions.

2. The episodic addition of ozone or hydrogen peroxide from the active remediation system causes a series of reactions to occur. Initially, dissolved ferrous iron will rapidly oxidize to ferric iron and precipitate as a ferric oxyhydroxide ( $\text{FeO}\cdot\text{OH}$ ) or hydroxide [ $\text{Fe}(\text{OH})_3$ ]. Dissolved trivalent arsenic will slowly oxidize to the pentavalent form and will adsorb on the surfaces of the freshly precipitated iron minerals. These reactions will lower the dissolved arsenic and iron concentrations.
3. Cessation of peroxide or ozone injections, as well as seasonal influences, allow the aquifer to return to reducing conditions. As the redox falls below a threshold value, the precipitated iron minerals will redissolve, and the adsorbed pentavalent arsenic will revert back to the mobile trivalent form.

## ***5.4 Review of Potential Source Areas of Arsenic***

Arsenic is a naturally occurring metal in the environment and varies in concentrations across geographic regions. In addition to naturally occurring levels of arsenic in site soils, this section provides a discussion of additional anthropogenic sources that may be contributing to the varied distribution of soil concentrations at the site.

### ***5.4.1 River Channel, Site Fill, and Site Grading Activities***

One of the most likely sources of arsenic is from materials that may have been used for filling and grading the site during development in the late 1940s and filling in the historic river channel in the 1960s. Based on maps of the historic river channel and aerial photographs, the majority of the current shoreline at the site appears to have been the original/historic shoreline of the river meander; however, land immediately south of the site (and potentially including the south end of the site) was formerly part of the river channel. If materials used for filling this area of the channel were contaminated with arsenic, this could explain why arsenic concentrations are highest at the south end of the site.

Historical records and subsurface investigations at the site have identified fill materials across the site. Similar to the river fill, contaminated fill may have been deposited directly onto the site during historic grading activities. The general practices of that time indicate that dredge materials from the Duwamish were typically used as fill material. These sediments could potentially have been impacted with arsenic prior to dredging and deposition onto the site.



#### 5.4.2 *State-Wide Arsenic Contamination*

Large areas of Washington State have elevated levels of arsenic (and lead) in soil from three historical sources: air emissions from metal smelters, lead arsenate pesticides, and combustion of leaded gasoline. Other sources of arsenic contamination include wood treated with chromated copper arsenate (often called "pressure-treated" wood), emissions from coal-fired power plants and incinerators, and other industrial processes.

A multi-agency chartered panel called the Area-Wide Soil Contamination Task Force (Task Force) was charged with developing findings and recommendations related to large areas of low-to moderate-level arsenic and lead soil contamination (so called "area-wide soil contamination") in Washington State. The Task Force published their findings in a report titled *Area-Wide Soil Contamination Task Force Final Report* (Task Force, 2003). According to the Task Force Report, "area-wide soil contamination" refers to low- to moderate-level soil contamination that is dispersed over a large geographic area, covering several hundred acres to many square miles. For schools, childcare centers, and residential land uses, in general, Ecology considers total arsenic concentrations of up to 100 milligrams per kilogram (mg/kg) to be within the low-to-moderate range. For properties where exposure of children is less likely or less frequent, such as commercial properties, parks, and camps, Ecology considers total arsenic concentrations of up to 200 mg/kg to be within the low-to-moderate range.

The Task Force considered area-wide arsenic and lead soil contamination primarily from two sources: past use of lead arsenate-based pesticides, and historical emissions from metal smelters located in Everett, Northport, Tacoma, and on Harbor Island (in Seattle). The study found that approximately 487,000 acres in Washington State has been affected by the smelters. The Task Force also considered the possibility of area-wide soil contamination from combustion of leaded gasoline, and made recommendations about gathering additional information on the potential for area-wide soil contamination from this source.

According Task Force Report, the range of concentrations of arsenic in soil associated with area-wide soil contamination is quite broad. Total arsenic concentrations range from natural background levels (7-9 mg/kg statewide) to over 3,000 mg/kg in smelter areas. Average concentrations of total arsenic in soil at developed properties with area-wide soil contamination generally are less than 100 mg/kg. By comparison, the MTCA soil cleanup levels for unrestricted land use for total arsenic is 20 mg/kg. Soil concentrations tend to be greater around the Tacoma smelter than in the other smelter areas, because the Tacoma smelter operated for a longer period and specialized in the processing of high-arsenic ore.



As indicated on **Figure 5-5**, the site is located within the estimated area-wide impacted plume from the Tacoma Smelter Site. It is possible that during filling of the site, highly impacted surface soils from within the 'area-wide soil contamination' plume were mixed with underlying site soils and redistributed throughout the site. Thus, these mixing and filling activities at the site may provide a partial explanation for the varied and unpredictable arsenic concentration patterns in soil.